Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of performing frequency error estimation and frame synchronization by a receiver in an orthogonal frequency division multiplexing (OFDM) communication system, the method comprising:

estimating, by a processor, frequency error at the receiver based on received symbols and a metric indicative of detected pilot power;

removing the estimated frequency error to obtain frequency-corrected pilot symbols; and

performing frame synchronization based on the metric and the frequency-corrected pilot symbols.

2. (Original) The method of claim 1, wherein the metric is based on cross-correlation between two received symbols for two symbol periods.

3. (Currently Amended) The method of claim 1, wherein the metric is based on [[the]] a decision statistic of a matched filter ~~method with~~ technique for detecting received pilot power, wherein the decision statistic comprises channel gain estimates.

4. (Original) The method of claim 1, wherein the estimating frequency error includes

computing, for each of a plurality of hypothesized frequency errors, a value for the metric based on the received symbols, wherein each of the hypothesized frequency errors corresponds to a different possible frequency error at the receiver, and wherein a plurality of metric values are obtained for the plurality of hypothesized frequency errors,

identifying a metric value with largest magnitude among the plurality of metric values, and

providing the hypothesized frequency error for the identified metric value as the estimated frequency error.

5. (Original) The method of claim 1, wherein the performing frame synchronization includes

computing a value for the metric for a current symbol period based on frequency-corrected pilot symbols obtained in one or more symbol periods including the current symbol period,

correlating a plurality of metric values, obtained for a plurality of symbol periods marked by the current symbol period, with a plurality of expected values to obtain a correlation value for the current symbol period, wherein the plurality of expected values are expected values for the plurality of metric values at a designated symbol period, and

performing peak detection on correlation values obtained for different symbol periods to determine frame synchronization.

6. (Original) The method of claim 1, further comprising:

descrambling the frequency-corrected pilot symbols with a pseudo-random number (PN) sequence to obtain descrambled pilot symbols, wherein the PN sequence is aligned based on the frame synchronization; and

estimating channel gain based on the descrambled pilot symbols.

7. (Original) The method of claim 6, further comprising:

performing data detection on frequency-corrected data symbols with channel gain estimates to obtain detected data symbols.

8. (Original) The method of claim 1, wherein the estimated frequency error is removed by rotating time-domain samples prior to performing fast Fourier transform (FFT) to obtain the received symbols.

9. (Original) The method of claim 1, wherein the estimated frequency error is removed by shifting subband indices by the estimated frequency error.

10. (Currently Amended) A receiver apparatus in an orthogonal frequency division multiplexing (OFDM) communication system, comprising:

a processor;

a frequency error estimator ~~operative~~ executable by the processor to estimate frequency error at the receiver apparatus based on a metric and received symbols, wherein the metric is indicative of detected pilot power;

a frequency correction unit ~~operative~~ executable by the processor to remove the estimated frequency error to obtain frequency-corrected pilot symbols; and

a frame synchronization unit ~~operative~~ executable by the processor to perform frame synchronization based on the metric and the frequency-corrected pilot symbols.

11. (Original) A receiver apparatus in an orthogonal frequency division multiplexing (OFDM) communication system, comprising:

means for estimating frequency error at the receiver apparatus based on a metric and received symbols, wherein the metric is indicative of detected pilot power;

means for removing the estimated frequency error to obtain frequency-corrected pilot symbols; and

means for performing frame synchronization based on the metric and the frequency-corrected pilot symbols.

12. (Currently Amended) A method of performing frequency error estimation by a receiver in an orthogonal frequency division multiplexing (OFDM) communication system, the method comprising:

computing, by a processor and for each of a plurality of hypothesized frequency errors, a value for a metric based on received symbols, wherein the metric is indicative of detected pilot power, wherein each of the hypothesized frequency errors corresponds to a different possible frequency error at the receiver, and wherein a plurality of metric values are obtained for the plurality of hypothesized frequency errors; and

estimating the frequency error at the receiver based on the plurality of metric values.

13. (Original) The method of claim 12, wherein the metric is defined based on cross-correlation between two received symbols for two symbol periods.

14. (Original) The method of claim 13, wherein the metric value for each hypothesized frequency error is computed by

computing, for each of a plurality of pilot subbands used for pilot transmission, cross-correlation between two received symbols obtained in two symbol periods for a hypothesized subband that is offset by the hypothesized frequency error from the pilot subband,

summing results of the cross-correlation for the plurality of pilot subbands to obtain a decision statistic, and

deriving the metric value for the hypothesized frequency error based on the decision statistic.

15. (Original) The method of claim 13, wherein the cross-correlation between the two received symbols for a hypothesized frequency error takes into account phase difference between the two received symbols due to the hypothesized frequency error.

16. (Currently Amended) The method of claim 12, wherein the metric is ~~defined~~ based on [[the]] <u>a decision statistic of a</u> matched ~~method~~ <u>filter technique for detecting received pilot power, wherein the decision statistic comprises channel gain estimates</u>.

17. (Currently Amended) The method of claim 16, wherein the metric value for each hypothesized frequency error is computed by

multiplying, for each of a plurality of pilot subbands used for pilot transmission, a channel gain estimate for a hypothesized subband with a received symbol for the hypothesized subband to obtain a matched filtered symbol for the pilot subband, the hypothesized subband being offset from the pilot subband by the hypothesized frequency error,

summing matched filtered symbols for the plurality of pilot subbands to obtain [[a]] <u>the</u> decision statistic, and

deriving the metric value for the hypothesized frequency error based on the decision statistic.

18. (Original) The method of claim 12, wherein the estimating the frequency error includes

identifying the metric value with largest magnitude among the plurality of metric values, and

providing a hypothesized frequency error for the identified metric value as an estimated frequency error for the receiver.

19. (Currently Amended) A receiver apparatus in an orthogonal frequency division multiplexing (OFDM) communication system, comprising:

a processor;

a correlation unit ~~operative~~ executable by the processor to compute, for each of a plurality of hypothesized frequency errors, a value for a metric based on received symbols, wherein the metric is indicative of detected pilot power, wherein each of the hypothesized frequency errors corresponds to a different possible frequency error at the receiver, and wherein a plurality of metric values are obtained for the plurality of hypothesized frequency errors; and

a detector ~~operative~~ executable by the processor to estimate the frequency error at the receiver apparatus based on the plurality of metric values.

20. (Original) The receiver apparatus of claim 19, wherein the correlation unit is operative, for each hypothesized frequency error, to

compute, for each of a plurality of pilot subbands used for pilot transmission, cross-correlation between two received symbols obtained in two symbol periods for a hypothesized subband that is offset by the hypothesized frequency error from the pilot subband,

sum results of the cross-correlation for the plurality of pilot subbands to obtain a decision statistic, and

derive the metric value for the hypothesized frequency error based on the decision statistic.

21. (Original) A receiver apparatus in an orthogonal frequency division multiplexing (OFDM) communication system, comprising:

means for computing, for each of a plurality of hypothesized frequency errors, a value for a metric based on received symbols, wherein the metric is indicative of detected pilot power, wherein each of the hypothesized frequency errors corresponds to a different possible frequency error at the receiver apparatus, and wherein a plurality of metric values are obtained for the plurality of hypothesized frequency errors; and

means for estimating the frequency error at the receiver apparatus based on the plurality of metric values.

22. (Currently Amended) A processor readable ~~media for storing~~ medium encoded with computer executable instructions ~~operable to~~, comprising:

at least one instruction executable by a computer to compute, for each of a plurality of hypothesized frequency errors, a value for a metric based on received symbols, wherein the metric is indicative of detected pilot power, wherein each of the hypothesized frequency errors corresponds to a different possible frequency error at a receiver, and wherein a plurality of metric values are obtained for the plurality of hypothesized frequency errors; and

at least one instruction executable by the computer to estimate the frequency error at the receiver based on the plurality of metric values.

23. (Currently Amended) A method of performing frame synchronization by a receiver in an orthogonal frequency division multiplexing (OFDM) communication system, the method comprising:

computing, by a processor, a value for a metric for a current symbol period based on received pilot symbols for one or more symbol periods including the current symbol period, wherein the metric is indicative of detected pilot power;

correlating a plurality of metric values, obtained for a plurality of symbol periods marked by the current symbol period, with a plurality of expected values to obtain a correlation value for the current symbol period, wherein the plurality of expected values are expected values for the plurality of metric values at a designated symbol period; and

performing peak detection on correlation values obtained for different symbol periods to determine frame synchronization.

24. (Original) The method of claim 23, further comprising:

performing frequency error estimation to obtain an estimated frequency error at the receiver, and wherein the metric value for the current symbol period accounts for the estimated frequency error.

25. (Original) The method of claim 23, wherein the peak detection is performed by

comparing the correlation value for the current symbol period against a threshold value, and

declaring frame synchronization if the correlation value is greater than the threshold value.

26. (Original) The method of claim 23, wherein the metric value for the current symbol period is obtained based on cross-correlation between received pilot symbols for the current symbol period and received pilot symbols for a prior symbol period.

27. (Original) The method of claim 23, wherein for each of a plurality of pilot subbands used for pilot transmission, pilot symbols for the pilot subband are scrambled with a pseudo-random number (PN) sequence prior to transmission.

28. (Original) The method of claim 27, wherein each of the plurality of expected values is obtained by cross-correlating a respective pair of chips in the PN sequence.

29. (Currently Amended) A receiver apparatus in an orthogonal frequency division multiplexing (OFDM) communication system, comprising:

a processor;

a metric computation unit ~~operative~~ executable by the processor to compute a value for a metric for a current symbol period based on received pilot symbols for one or more symbol

periods including the current symbol period, wherein the metric is indicative of detected pilot power;

a correlator ~~operative~~ executable by the processor to correlate a plurality of metric values, obtained for a plurality of symbol periods marked by the current symbol period, with a plurality of expected values to obtain a correlation value for the current symbol period, wherein the plurality of expected values are expected values for the plurality of metric values at a designated symbol period; and

a peak detector ~~operative~~ executable by the processor to perform peak detection on correlation values obtained for different symbol periods to determine frame synchronization.

30. (Original) The receiver apparatus of claim 29, wherein for each of a plurality of pilot subbands used for pilot transmission, pilot symbols for the pilot subband are scrambled with a pseudo-random number (PN) sequence prior to transmission.

31. (Original) The receiver apparatus of claim 30, wherein the metric value for the current symbol period is obtained based on cross-correlation between received pilot symbols for the current symbol period and received pilot symbols for a prior symbol period, and wherein each of the plurality of expected values is obtained by cross-correlating a respective pair of chips in the PN sequence.

32. (Original) A receiver apparatus in an orthogonal frequency division multiplexing (OFDM) communication system, comprising:

means for computing a value for a metric for a current symbol period based on received pilot symbols for one or more symbol periods including the current symbol period, wherein the metric is indicative of detected pilot power;

means for correlating a plurality of metric values, obtained for a plurality of symbol periods marked by the current symbol period, with a plurality of expected values to obtain a correlation value for the current symbol period, wherein the plurality of expected values are expected values for the plurality of metric values at a designated symbol period; and

means for performing peak detection on correlation values obtained for different symbol periods to determine frame synchronization.

33. (New) The apparatus of claim 10, wherein the metric is based on cross-correlation between two received symbols for two symbol periods.

34. (New) The apparatus of claim 10, wherein the metric is based on a decision statistic of a matched filter technique for detecting received pilot power, wherein the decision statistic comprises channel gain estimates.

35. (New) The apparatus of claim 10, wherein the frequency error estimator is further configured to:

compute, for each of a plurality of hypothesized frequency errors, a value for the metric based on the received symbols, wherein each of the hypothesized frequency errors corresponds to a different possible frequency error at the receiver, and wherein a plurality of metric values are obtained for the plurality of hypothesized frequency errors,

identify a metric value with largest magnitude among the plurality of metric values, and

provide the hypothesized frequency error for the identified metric value as the estimated frequency error.

36. (New) The apparatus of claim 10, wherein the frame synchronization unit is further configured to:

compute a value for the metric for a current symbol period based on frequency-corrected pilot symbols obtained in one or more symbol periods including the current symbol period,

correlate a plurality of metric values, obtained for a plurality of symbol periods marked by the current symbol period, with a plurality of expected values to obtain a correlation value for the current symbol period, wherein the plurality of expected values are expected values for the plurality of metric values at a designated symbol period, and

perform peak detection on correlation values obtained for different symbol periods to determine frame synchronization.

37. (New) The apparatus of claim 10, wherein the processor is further configured to:

descramble the frequency-corrected pilot symbols with a pseudo-random number (PN) sequence to obtain descrambled pilot symbols, wherein the PN sequence is aligned based on the frame synchronization; and

estimate channel gain based on the descrambled pilot symbols.

38. (New) The apparatus of claim 37, wherein the processor is further configured to perform data detection on frequency-corrected data symbols with channel gain estimates to obtain detected data symbols.

39. (New) The apparatus of claim 10, wherein the processor is further configured to remove the estimated frequency error by rotating time-domain samples prior to performing fast Fourier transform (FFT) to obtain the received symbols.

40. (New) The apparatus of claim 10, wherein the processor is further configured to remove the estimated frequency error by shifting subband indices by the estimated frequency error.

41. (New) A processor readable medium encoded with computer executable instructions of performing frequency error estimation and frame synchronization in an orthogonal frequency division multiplexing (OFDM) communication system, the instructions comprising:

at least one instruction executable by a computer to estimate frequency error based on received symbols and a metric indicative of detected pilot power;

at least one instruction executable by the computer to remove the estimated frequency error to obtain frequency-corrected pilot symbols; and

at least one instruction executable by the computer to perform frame synchronization based on the metric and the frequency-corrected pilot symbols.

42. (New) The apparatus of claim 19, wherein the metric is defined based on cross-correlation between two received symbols for two symbol periods.

43. (New) The apparatus of claim 20, wherein the cross-correlation between the two received symbols for a hypothesized frequency error takes into account phase difference between the two received symbols due to the hypothesized frequency error.

44. (New) The apparatus of claim 19, wherein the metric is based on a decision statistic of a matched filter technique for detecting received pilot power, wherein the decision statistic comprises channel gain estimates.

45. (New) The apparatus of claim 44, wherein the metric value for each hypothesized frequency error is computed by

multiplying, for each of a plurality of pilot subbands used for pilot transmission, a channel gain estimate for a hypothesized subband with a received symbol for the hypothesized subband to obtain a matched filtered symbol for the pilot subband, the hypothesized subband being offset from the pilot subband by the hypothesized frequency error,

summing matched filtered symbols for the plurality of pilot subbands to obtain the decision statistic, and

deriving the metric value for the hypothesized frequency error based on the decision statistic.

46. (New) The apparatus of claim 19, wherein the detector is further configured to:

identify the metric value with largest magnitude among the plurality of metric values, and

provide a hypothesized frequency error for the identified metric value as an estimated frequency error for the receiver.

47. (New) The apparatus of claim 29, wherein the processor is further configured to:

perform frequency error estimation to obtain an estimated frequency error at the receiver, and wherein the metric value for the current symbol period accounts for the estimated frequency error.

48. (New) The apparatus of claim 29, wherein the peak detector is further configured to:

compare the correlation value for the current symbol period against a threshold value, and declare frame synchronization if the correlation value is greater than the threshold value.

49. (New) The apparatus of claim 29, wherein the metric value for the current symbol period is obtained based on cross-correlation between received pilot symbols for the current symbol period and received pilot symbols for a prior symbol period.

50. (New) A processor readable medium encoded with computer executable instructions of performing frame synchronization in an orthogonal frequency division multiplexing (OFDM) communication system, the instructions comprising:

at least one instruction executable by a computer to compute a value for a metric for a current symbol period based on received pilot symbols for one or more symbol periods including the current symbol period, wherein the metric is indicative of detected pilot power;

at least one instruction executable by the computer to correlate a plurality of metric values, obtained for a plurality of symbol periods marked by the current symbol period, with a plurality of expected values to obtain a correlation value for the current symbol period, wherein the plurality of expected values are expected values for the plurality of metric values at a designated symbol period; and

at least one instruction executable by the computer to perform peak detection on correlation values obtained for different symbol periods to determine frame synchronization.